IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Charles D. Young and James E. Stevens

Serial No: 09/303,802

Filed: April 30, 1999

Group Art Unit: 2662

For: Clique Activation Multiple Access (CAMA)

Examiner: D. Odland
(703) 305-3231

Attorney Docket: 97CR159/KE

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APPLICANT'S BRIEF ON APPEAL TO THE BOARD

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APPLICANT'S BRIEF ON APPEAL TO THE BOARD

This is an appeal from the final rejection of the Examiner dated September 17, 2002, rejecting all of the claims in the case. This Brief is accompanied by the requisite fee set forth in §1.17(c).

REAL PARTY IN INTEREST

The real party in interest in this appeal is the assignee, Rockwell Collins Inc.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
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RELATED APPEALS AND INTERFERENCES

The application on appeal is not subject to, or an element in, any other appeal or interference proceeding within the U.S. Patent and Trademark Office.

STATUS OF CLAIMS

Claims 1-2 and 20-29 are pending, have been finally rejected, and are all on appeal.

STATUS OF AMENDMENTS

On July 9, 2002, Amendment A was entered. Amendment B, which was filed December 17, 2002 after the Examiner issued a Final Rejection, was not entered. Amendment C, filed concurrently with this Appeal Brief, has not yet been entered.

SUMMARY OF THE INVENTION

Now referring to Figure 4 and, and generally to pages 6 through 11 of the specification, and generally speaking, and without prejudice to the scope of the claims, the invention in the claims on appeal relates to: a plurality of transmitters (p. 6 lines 1-4) capable of forming a communications network, in which each transmitter is a node. Each node directly communicates with certain of the other nodes, but does not directly communicate with other nodes in the network. To transmit packets of information between nodes that do not communicate directly with each other, it is necessary to transmit the packets through intermediate nodes, beginning

with nodes that are neighbors of the transmitting node. In Figure 1, for instance, packets transmitted from node 8 to node 2 would need to be transmitted to a neighbor of node 8 (such as node 1), then to a neighbor of node 1 (such as node 3), and then to node 2. Of course, other paths through different neighbors of node 8 could also be used (8-7-6-5-4-3-2, for instance).

There is typically a limited amount of time slots to broadcast data, and the time slots must therefore somehow be shared between the nodes in an efficient manner. The invention provides a method for automatically managing the communication channel resources between two transceiver nodes having neighboring transceiver nodes in a network of transceiver nodes (such as 2 and 10 in Figure 4), wherein each node communicates during specific time slots and uses multiple frequencies on a time multiplex basis. According to the method, possible communication time slots and frequencies between nodes in the network are stored at each transceiver node. Each node is assigned to at least one of a plurality of cliques (p. 6 lines 7-8). Each of the plurality of cliques consists of a plurality of nodes that are positioned to directly communicate with each other (p. 6 lines 3-5 and p. 6 line 26 through p. 7 line 2; see also Figure 4). Multiple transceiver nodes in a clique utilize the same time slot for transmitting (p. 6 lines 2-4). The transceiver nodes within a clique take turns transmitting within a shared time slot.

The step of assigning each node to at least one of a plurality of cliques can include: identifying one of the nodes, compiling a first list of nodes that directly communicate with the identified node, and for each node in the first list, compiling a second list of nodes that directly communicate the node in the first list. A clique is then defined as the identified node, a node from the first list, and a node from the second list that directly communicates with the previous

two nodes (p. 6 line 26 – page 7 line 2). All possible cliques to which the identified node belongs to are identified by repeating these steps until all possible combinations of nodes have been explored (Figures 6 and 7; page 7 lines 10-15). The cliques to which every node in the network belongs may be determined by repeating the previous steps for each node.

Time slots for each clique are chosen (p. 9 line 19-28) according to a hierarchy wherein:

a) cliques having a node that is a member of only one clique are first assigned time slots (p. 10 line 24);

b) cliques having at least as many neighboring cliques as any neighboring clique are next assigned time slots (p. 10 lines 25-26);

c) cliques having two or more neighbors that were assigned time slots in steps (a) and (b) above are next assigned time slots (p. 10 line 27);

d) cliques having two or more neighbors that were assigned time slots in step (a) above are next assigned time slots (p. 10 line 28);

e) cliques having a node that is not included in a clique that has previously been assigned a time slot are next assigned time slots (p. 10 line 29); and

f) cliques that have not yet been assigned a time slot are assigned time slots (p. 11 line 1).

ISSUES

The issues on appeal are as follows:

ISSUE 1 - INDEFINITENESS

Whether claims 20-22 and 24-29 are unpatentable under 35 U.S.C. §112, second paragraph as being indefinite.

ISSUE 2 - OBVIOUSNESS

Whether the subject matter of claims 1, 2 and 23 are unpatentable under 35 U.S.C. §103(a) as being anticipated by the Young (5,719,868) reference.

GROUPING OF CLAIMS

For ISSUE 1

Group A includes claims 20-22.

Group B includes claim 24.

Group C includes claims 25-29.

For ISSUE 2

Group D includes claim 1.

Group E includes claim 2.

Group F includes claim 23.

ARGUMENTS FOR REVERSAL OF THE INDEFINITENESS REJECTION

The Examiner has rejected claims 20-22 and 24-29 as being unpatentable under 35 U.S.C. §112, second paragraph for being indefinite. The Applicants have grouped the claims into Group A, Group B and Group C under this rejection. To reduce the number of issues on appeal, Applicants have submitted concurrently herewith an Amendment that addresses the Examiner's indefiniteness rejections to each of the claim groupings. For convenience, these amendments to the claims are included herewith in Appendix 2. Each of Groups A – C will now be discussed in turn.

Group A: In the Final Rejection dated September 17, 2002, The Examiner rejected claim 20, asserting step (d) is confusing. Step (d) of claim 20 reads:

(d) including within a clique with said one of the nodes

a node in said first group of nodes, and

a node in said second group of nodes that communicates directly with said one of the nodes node and with said node in said first group of nodes.

The Examiner stated that "it is unclear whether plural groups of nodes make up a clique and also unclear which node(s) of which group(s) of which clique(s) are directly communicating."

As explained in Applicant's specification, a clique is a group of transmitters, or nodes, that are all neighbors of each other (p.6 lines 2-5). One way to define a clique is described at page 6 line 26 to page 7 line 2 of Applicants' specification:

> Cliques can be created using a list of neighbors and a list of each neighbor's neighbors. To generate the cliques that a node is a member of, a node must consider all combinations of its node identification (id)...with those ids of its neighbors (using its neighbor list) and the node must examine each combination for complete connectedness (using each neighbor's list of neighbors).

This method of defining a clique is echoed in Applicants' claim 20, in which a node (the node identified in step (a)), a list of the node's neighbors (the first group of nodes), and each neighbor's list of neighbors (the second group of nodes) are examined for complete connectedness (direct communication with each other).

Applicants agree that some of the language in claim 20 is somewhat confusing, and in the Amendment submitted concurrently herewith, applicants amended claim 20 to eliminate such confusion. Specifically, claim 20 now recites that the method: identifies a node in step (a); identifies a first group of nodes that directly communicate *with the node identified in step (a);* identifies, for each node in the first group of nodes, a second group of nodes, wherein each of the second group of nodes communicates directly with its respective node in the first group of nodes; and include within a clique *the node identified in step (a)*, a node in the first group of nodes, and a node in the second group of nodes that communicates directly with the *node identified in step (a)* and with the node from the first group of nodes. It is believed that by defining the clique as based upon the node identified in step (a), it is clear that a clique is defined, in claim 20, as searching (1) a node's neighbors, and (2) the neighbor's neighbors, for complete connectedness,

as explained in Applicant's specification. A clique is therefore made up of nodes selected from the first and second groups of nodes that directly communicate with each other and with the node selected in step (a) of claim 20.

Claims 21 and 22 were rejected under 35 U.S.C. § 112, second paragraph, as depending from claim 20. However, with the above amendment and explanation, the Examiner's rejection of claim 20 should be withdrawn, and the rejection to claims 21 and 22 should therefore be withdrawn as well.

Group B: The Examiner rejected claim 24 as being confusing "because it recites a step (f) while its parent claim (claim 1) does not recite any earlier steps, namely (a) – (e)." The Examiner is in error: Applicant disagrees that such a naming of steps is confusing. Method steps recited in claims 24-27 are named (f), (g) and (h) to differentiate these steps from steps (a) – (e) recited in claims 20-22. Naming the steps (f) (g) and (h) does not necessarily imply that previous steps are required, or that the steps (a)-(e) in claims 20-22 are implicitly included in claim 24. However, in the interest of reducing issues on appeal, in the concurrently filed Amendment Applicants have amended claims 24-27 to replace (f)-(h) with (a)-(c), respectively. Such amendment, if accepted, would remove the Examiner's indefiniteness rejection of claim 24 and of claims 25-29, which depend directly or indirectly from claim 24.

Group C: The Examiner rejected claim 25, asserting that "[i]t is unclear what is meant by 'at least as many neighboring clique as any neighboring clique.'" A method of assigning time slots to cliques to minimize the number of slots required to accommodate communications

between nodes is described beginning at page 10 line 16. According to the method (page 10 lines 19-22):

> The idea is to first assign slots to cliques that have an isolated node on the edges of the network, *then to assign slots to the most richly connected cliques in the interior,* and then to assign slots to cliques that bridge these.

(Italics added for emphasis) The specification describes how this idea is implemented by outlining six ordered steps or conditions that the slot assignment method goes through. The second of the ordered conditions (page 10 lines 25-26) is that a clique is assigned a time slot if it has "more or an equal amount of neighboring cliques as any neighboring clique." In other words, a clique is assigned a time slot at this point in the assignment hierarchy if the clique is "richly connected" to other cliques in the interior of the network.

Applicants have amended claim 25 to recite that "cliques having as many neighboring *cliques* as any neighboring clique are next assigned time slots." The amendment changes the word "clique" to the italicized "cliques," thereby clarifying the step. As it is now clear what is meant by this claim, the Examiner's rejection thereto (and to claims 26-29, which depend therefrom) should be withdrawn.

ARGUMENTS FOR REVERSAL OF THE OBVIOUSNESS REJECTION

The Applicants have grouped the claims into Group A, Group B and Group C under this rejection. Each of these Groups will be discussed in turn.

Group D: The Examiner rejected claim 1 based on the Young reference.

Independent claim 1 contains the following limitations:

> storing possible communication time slots and frequencies between nodes in the network at each transceiver node; and
>
> assigning each node to at least one of a plurality of cliques, wherein **each of the plurality of cliques consists of a plurality of nodes that are positioned to directly communicate with each other, wherein multiple transceiver nodes in a clique utilize the same time slot for transmitting.**

The Examiner cites Young's grouping of nodes into neighborhoods, which the Examiner concedes "consist of multiple hops," as a basis for Applicants' claimed "cliques." In fact, the neighborhoods of Young consist of nodes within line-of-sight or one hop of a transmitter (col. 1 lines 19-21). The Examiner concedes that the neighborhoods of Young, as defined therein, are not the cliques as defined in Applicant's claim 1. However, the Examiner concludes it would be obvious for Young to only include nodes in a neighborhood that directly communicate with each other because it is "well known in the art that communication between nodes of a network consisting of a small number of hops operate faster than a network consisting of a larger number of hops." The Examiner is in error. It is arguable whether increasing or decreasing the number of hops within the neighborhoods of Young would make for quicker communication between nodes. However, even if Young could be modified in such a manner, Applicants' claimed invention could not be arrived at using Young as a reference. In the Final Rejection to Applicants' claim 1, **the Examiner failed to discuss a limitation of claim 1, and did not show how that limitation was met, addressed, or rendered obvious by Young.** Specifically, the

Examiner failed to address Applicants' limitation in claim 1 that **"multiple transceiver nodes in a clique utilize the same time slot for transmitting."** It is understandable why the Examiner failed to address this limitation: Young does not teach or disclose that nodes within its neighborhoods use the same time slot for transmitting; in fact, Young teaches quite the opposite. Young discloses a communications method that uses the neighborhoods of two nodes to prevent conflicts in communicating between two nodes (Column 1 lines 60-66), where each node in the network is assigned a slot (Column 2 lines 30-32). In contrast, it is *groups of nodes*- the 'cliques' of Applicants' claim 1- that use the same time slot for transmitting. Merely reducing the number of hops in Young's 'neighborhoods' would not lead one of ordinary skill in the art to Applicants' use of the same slot for the nodes within such a neighborhood, as recited in Applicants' claim 1. Because **Young fails to disclose and teaches away from** Applicants' cliques using the same time slot for transmitting, and because the Examiner failed to discuss this limitation, claim 1 is allowable. All claims depending therefrom are also allowable.

Group E: The Examiner rejected claim 2 based upon the Young reference. The Examiner asserts that "Young discloses that the nodes within a clique take turns transmitting within a shared time slot (each node shares a broadcast time slot, in which each uses for control packets [see column 2 lines 26-35])." The Examiner is in error. Column 2 lines 26-35 of Young reads as follows:

> Referring to FIG. 2, a time division multiple access structure for use with the present method is illustrated. A cycle 20 includes N frames 22. Each frame 22 consists of M slots 24, the first slot 24a is a broadcast slot for network manager control packets. **A broadcast slot 24a is assigned to each node in the network,** so if there are N nodes, each node has an opportunity to

transmit its control packet once every N frames which represents a cycle 20. Additionally, associated with each frame 22 are multiple frequency channels 26.

The Examiner has incorrectly concluded what is disclosed by Young. Contrary to the Examiner's assertions, Young does not disclose that each node shares a broadcast time slot, and Young does not disclose that the nodes within a clique (Young discloses neighborhoods, not cliques) take turns transmitting within a shared time slot. Claim 2 is therefore allowable.

Group F: The Examiner rejected claim 23 based on Young, asserting that "Young discloses choosing time slots for each clique (identifying, in tables, the transmit time slot for each node in a neighborhood [see claim 1])." The Examiner is in error because Young does not disclose choosing time slots for each clique. The process of identifying the transmit time slot for each node in a neighborhood (as in Young) is a **node-by-node assignment**, which is different from choosing time slots for **groups of nodes** (such as Applicants' clique). The efficiency of the present invention is that using the concept of cliques, multiple nodes may be assigned time slots where previously, as in Young, only individual nodes are assigned time slots.

The Examiner's rejection of claim 23, and the characterization of Young to effect said rejection, is inconsistent with previous rejections. In the rejection of claim 1, the Examiner equated Applicants' "cliques" with the "neighborhoods" of Young; however, in the rejection of claim 23, the Examiner equates Applicants' assigning transmit time slots for **cliques** with Young's assigning time slots for **nodes.** This inconsistent characterization of the Young reference is further evidence that Young cannot be used to sustain an obviousness rejection over Applicants' claims.

CONCLUSION OF ARGUMENTS

Because the Examiner (1) failed to discuss a limitation of claim 1, and did not show that limitation was met, addressed, or rendered obvious by Young, (2) incorrectly concluded what was disclosed by Young to meet the recitations of claim 2, and (3) Young does not disclose choosing time slots for each clique as recited in claim 23, the Examiner's rejection of obvioussness based upon Young should be overturned.

Respectfully Submitted,

17 Apr 2003
Date

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APPENDIX 1: CLAIMS ON APPEAL

The following is the state of the claims as currently pending in the application. Appendix 2 contains a listing of claims 20 and 24-27 as those claims would be amended if the Amendment, submitted concurrently with this Appeal Brief, were entered.

1. A method for automatically managing the communication channel resources between two transceiver nodes having neighboring transceiver nodes in a network of transceiver nodes, wherein each node communicates during specific time slots and uses multiple frequencies on a time multiplex basis, the method comprising:

storing possible communication time slots and frequencies between nodes in the network at each transceiver node; and

assigning each node to at least one of a plurality of cliques, wherein each of the plurality of cliques consists of a plurality of nodes that are positioned to directly communicate with each other, wherein multiple transceiver nodes in a clique utilize the same time slot for transmitting.

2. The method of claim 1 wherein the transceiver nodes within a clique take turns transmitting within a shared time slot.

20. The method of claim 1, wherein the assigning step for each node comprises:

(a) identifying one of the nodes;

(b) identifying a first group of nodes, said first group of nodes comprising any nodes that directly communicate with said one of the nodes;

(c) for each node in the first group of nodes, identifying a second group of nodes, said second group of nodes comprising any nodes that directly communicate with said each node in the first group of nodes; and

(d) including within a clique with said one of the nodes

a node in said first group of nodes, and

a node in said second group of nodes that communicates directly with said one of the nodes node and with said node in said first group of nodes.

21. The method of claim 20, further comprising:

(e) identifying all possible cliques to which said one of the nodes belongs by repeating steps (b), (c), and (d) until all possible combinations of nodes have been explored.

22. The method of claim 21, further comprising repeating steps (a), (b), (c), (d) and (e) for each node in the network of nodes.

23. The method of claim 1, further comprising choosing time slots for each clique.

24. The method of claim 23, wherein the step of choosing time slots comprises assigning time slots to the cliques according to a hierarchy wherein:

(f) cliques having a node that is a member of only one clique are first assigned time slots.

25. The method of claim 24, wherein:

(g) cliques having at least as many neighboring clique as any neighboring clique are next assigned time slots.

26. The method of claim 25, wherein:

(h) cliques having two or more neighbors that were assigned time slots in steps (f) and (g) are next assigned time slots.

27. The method of claim 26, wherein cliques having two or more neighbors that were assigned time slots in step (f) are next assigned time slots.

28. The method of claim 27, wherein cliques having a node that is not included in a clique that has previously been assigned a time slot are next assigned time slots.

29. The method of claim 28, wherein cliques that have not yet been assigned a time slot are assigned time slots.

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APPENDIX 2: PROPOSED AMENDMENTS TO CLAIMS ON APPEAL

The following reflects changes to claims 20 and 24-27 as proposed in the Amendment concurrently submitted herewith. Insertions have been underlined and deletions have been bracketed.

20. (Once Amended) The method of claim 1, wherein the assigning step for each node comprises:

(a) identifying one of the nodes;

(b) identifying a first group of nodes, said first group of nodes comprising any nodes that directly communicate with [said one of] the [nodes] node identified in step (a);

(c) for each node in the first group of nodes, identifying a second group of nodes, said second group of nodes comprising any nodes that directly communicate with said each node in the first group of nodes; and

(d) including within a clique with [said one of] the [nodes] node identified in step (a)

a node in said first group of nodes, and

a node in said second group of nodes that communicates directly with [said one of] the [nodes] node identified in step (a) and with said node in said first group of nodes.

24. (Once Amended) The method of claim 23, wherein the step of choosing time slots comprises assigning time slots to the cliques according to a hierarchy wherein:

([f]a) cliques having a node that is a member of only one clique are first assigned time slots.

25. (Once Amended) The method of claim 24, wherein:

([g]b) cliques having at least as many neighboring [clique] cliques as any neighboring clique are next assigned time slots.

26. (Once Amended) The method of claim 25, wherein:

([h]c) cliques having two or more neighbors that were assigned time slots in steps ([f]a) and ([g]b) are next assigned time slots.

27. (Once Amended) The method of claim 26, wherein cliques having two or more neighbors that were assigned time slots in step ([f]a) are next assigned time slots.